

WHAT IS CLAIMED IS:

1. A fuel additive for use in reducing a pollutant emission produced during combustion of a hydrocarbon fuel, the fuel additive comprising:

a plant oil extract;  
an antioxidant; and  
a thermal stabilizer.

2. The fuel additive of claim 1, wherein the plant oil extract comprises an oil extract of a plant of the *Leguminosae* family.

3. The fuel additive of claim 1, wherein the plant oil extract is selected from the group consisting of oil extract of vetch and oil extract of barley.

4. The fuel additive of claim 1, wherein the plant oil extract comprises chlorophyll.

5. The fuel additive of claim 1, wherein the antioxidant comprises  $\beta$ -carotene.

6. The fuel additive of claim 1, wherein the thermal stabilizer comprises jojoba oil.

7. The fuel additive of claim 1, wherein the thermal stabilizer comprises an ester of a C20-C22 straight chain monounsaturated carboxylic acid.

8. The fuel additive of claim 1, wherein the plant oil extract comprises oil extract of vetch, wherein the antioxidant comprises  $\beta$ -carotene, and wherein the thermal stabilizer comprises jojoba oil.

9. The fuel additive of claim 1, further comprising a diluent.

10. The fuel additive of claim 9, wherein the diluent is selected from the group consisting of toluene, gasoline, diesel fuel, jet fuel, and mixtures thereof.

11. The fuel additive of claim 1, further comprising an oxygenate.

12. The fuel additive of claim 11, wherein the oxygenate is selected from the group consisting of methanol, ethanol, methyl tertiary butyl ether, ethyl tertiary butyl ether, and tertiary amyl methyl ether, and mixtures thereof.

13. The fuel additive of claim 1, further comprising at least one additional additive selected from the group consisting of octane improvers, cetane improvers, detergents, demulsifiers, corrosion inhibitors, metal deactivators, ignition accelerators,

dispersants, anti-knock additives, anti-run-on additives, anti-pre-ignition additives, anti-misfire additives, antiwear additives, antioxidants, demulsifiers, carrier fluids, solvents, fuel economy additives, emission reduction additives, lubricity improvers, and mixtures thereof.

5           14.     The fuel additive of claim 8, wherein a ratio of grams of plant oil extract of vetch to grams of  $\beta$ -carotene in the additive is from about 50:1 to about 1:0.05, wherein a ratio of grams of oil extract of vetch to milliliters jojoba oil in the additive is from about 12:1 to about 1:0.05, and wherein a ratio of milliliters jojoba oil to grams of  $\beta$ -carotene in the additive is from about 12:1 to about 1:0.5.

10           15.     The fuel additive of claim 8, wherein a ratio of grams of plant oil extract of vetch to grams of  $\beta$ -carotene in the additive is from about 24:1 to about 1:0.1, wherein a ratio of grams of oil extract of vetch to milliliters jojoba oil in the additive is from about 6:1 to about 1:0.1, and wherein a ratio of milliliters jojoba oil to grams of  $\beta$ -carotene in the additive is from about 6:1 to about 1:1.

15           16.     A hydrocarbon fuel, the fuel comprising a base fuel and a fuel additive for use in reducing a pollutant emission produced during combustion of the hydrocarbon fuel, the fuel additive comprising:

- a plant oil extract;
- an antioxidant; and
- 20           a thermal stabilizer.

          17.     The hydrocarbon fuel of claim 16, wherein the fuel comprises a liquid hydrocarbon fuel

          18.     The hydrocarbon fuel of claim 16, wherein the fuel comprises a solid hydrocarbon fuel

25           19.     The liquid hydrocarbon fuel of claim 17, wherein the plant oil extract comprises oil extract of vetch, wherein the antioxidant comprises  $\beta$ -carotene, wherein the thermal stabilizer comprises jojoba oil, and wherein the fuel comprises from about 0.0005 g to about 0.05 g oil extract of vetch per 3785 ml liquid hydrocarbon fuel, from about 0.00025 g to about 0.05 g  $\beta$ -carotene per 3785 ml liquid hydrocarbon fuel, and  
30           from about 0.001 ml to about 0.05 ml jojoba oil per 3785 ml liquid hydrocarbon fuel.

20. The liquid hydrocarbon fuel of claim 17, wherein the plant oil extract comprises oil extract of vetch, wherein the antioxidant comprises  $\beta$ -carotene, wherein the thermal stabilizer comprises jojoba oil, and wherein the fuel comprises from about 0.0013 g to about 0.023 g oil extract of vetch per 3785 ml liquid hydrocarbon fuel, from about 0.00053 g to about 0.021 g  $\beta$ -carotene per 3785 ml liquid hydrocarbon fuel, and from about 0.0018 ml to about 0.022 ml jojoba oil per 3785 ml liquid hydrocarbon fuel.

21. The solid hydrocarbon fuel of claim 18, wherein the plant oil extract comprises oil extract of vetch, wherein the antioxidant comprises  $\beta$ -carotene, wherein the thermal stabilizer comprises jojoba oil, and wherein the fuel comprises from about 2 g to about 10 g oil extract of vetch per 1000 kg solid hydrocarbon fuel, from about 2 g to about 50 g  $\beta$ -carotene per 1000 kg solid hydrocarbon fuel, and from about 1 ml to about 10 ml jojoba oil per 1000 kg solid hydrocarbon fuel.

22. The solid hydrocarbon fuel of claim 18, wherein the plant oil extract comprises oil extract of vetch, wherein the antioxidant comprises  $\beta$ -carotene, wherein the thermal stabilizer comprises jojoba oil, and wherein the fuel comprises from about 3.42 g to about 4.26 g oil extract of vetch per 1000 kg solid hydrocarbon fuel, from about 4.25 g to about 14.75 g  $\beta$ -carotene per 1000 kg solid hydrocarbon fuel, and from about 1.9 ml to about 5.7 ml jojoba oil per 1000 kg solid hydrocarbon fuel.

23. A method for producing a liquid hydrocarbon fuel, the method comprising the steps of:

preparing a first additive by combining  $\beta$ -carotene, jojoba oil, and a diluent, the first additive comprising about 4 ml jojoba oil and about 4 g  $\beta$ -carotene per 3785 ml of the first additive;

preparing a second additive by combining an oil extract of vetch, jojoba oil, and a diluent, the second additive comprising about 4 ml jojoba oil and about 19.36 g oil extract of vetch per 3785 ml of the second additive; and

adding the first additive and the second additive to a base fuel to produce a liquid hydrocarbon fuel, such that the liquid hydrocarbon fuel comprises from about 0.15 ml to about 20 ml of the first additive per 3785 ml of liquid hydrocarbon fuel and from about 0.3 ml to about 3.6 ml of the second additive per 3785 ml of liquid hydrocarbon fuel.

24. A method for producing a liquid hydrocarbon fuel, the method comprising the steps of:

5 preparing a first additive by combining  $\beta$ -carotene, jojoba oil, and a diluent, the first additive comprising about 32 ml jojoba oil and about 32 g  $\beta$ -carotene per 3785 ml of the first additive;

preparing a second additive by combining an oil extract of vetch, jojoba oil, and a diluent, the second additive comprising about 32 ml jojoba oil and about 155 g oil extract of vetch per 3785 ml of the second additive; and

10 adding the first additive and the second additive to a base fuel to produce a liquid hydrocarbon fuel, such that the liquid hydrocarbon fuel comprises from about 0.0625 ml to about 0.625 ml of the first additive per 3785 ml of liquid hydrocarbon fuel and from about 0.3 ml to about 0.45 ml of the second additive per 3785 ml of liquid hydrocarbon fuel.